FIFTH UNITED NATIONS GLOBAL ROAD SAFETY WEEK
6-12 May 2019

Save Lives
#SpeakUp

Big data for road safety
– For Safety –

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Together with:
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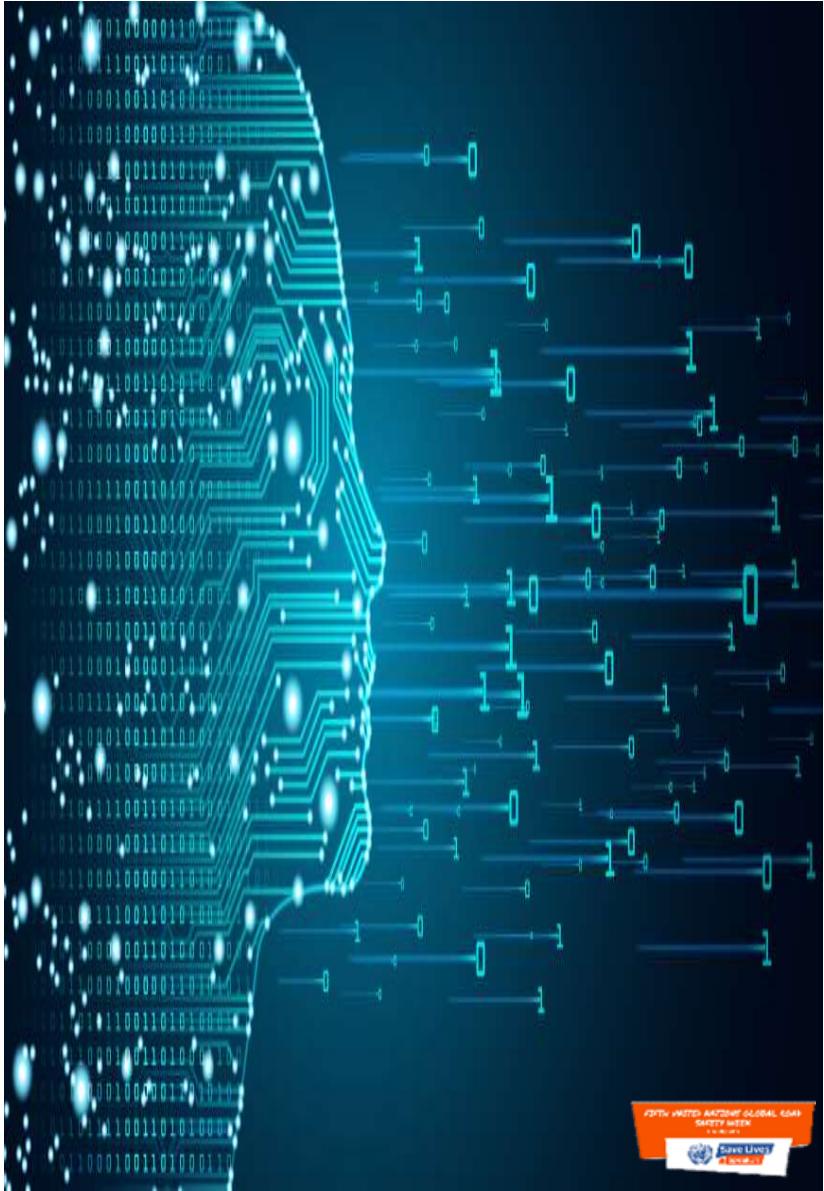
Background

- Contemporary road safety analyses still rely too much on traditional data collection methodologies, so new ways of extracting data are necessary in the new technological landscape

- Big Data might be the solution that will assist researchers, practitioners and decision makers:
  - Real-time aspect of data
  - Easy acquisition from various sources
    - Smartphones, OBD, cellular networks etc.
  - Easy transfer and storage of data to other projects and/or for later use
  - Time and cost efficient



Research Questions

- Exploration of the availability of big data that could provide additional insight on road safety analysis.
- Examination of existing data sources with high-resolution data useful for road safety analyses at both macroscopic and microscopic level.
- Exploration of available data useful for a multi-layer approach of road safety analysis:
  - Risk exposure data
  - Road safety performance indicators
  - Accident data

Methodological Challenges

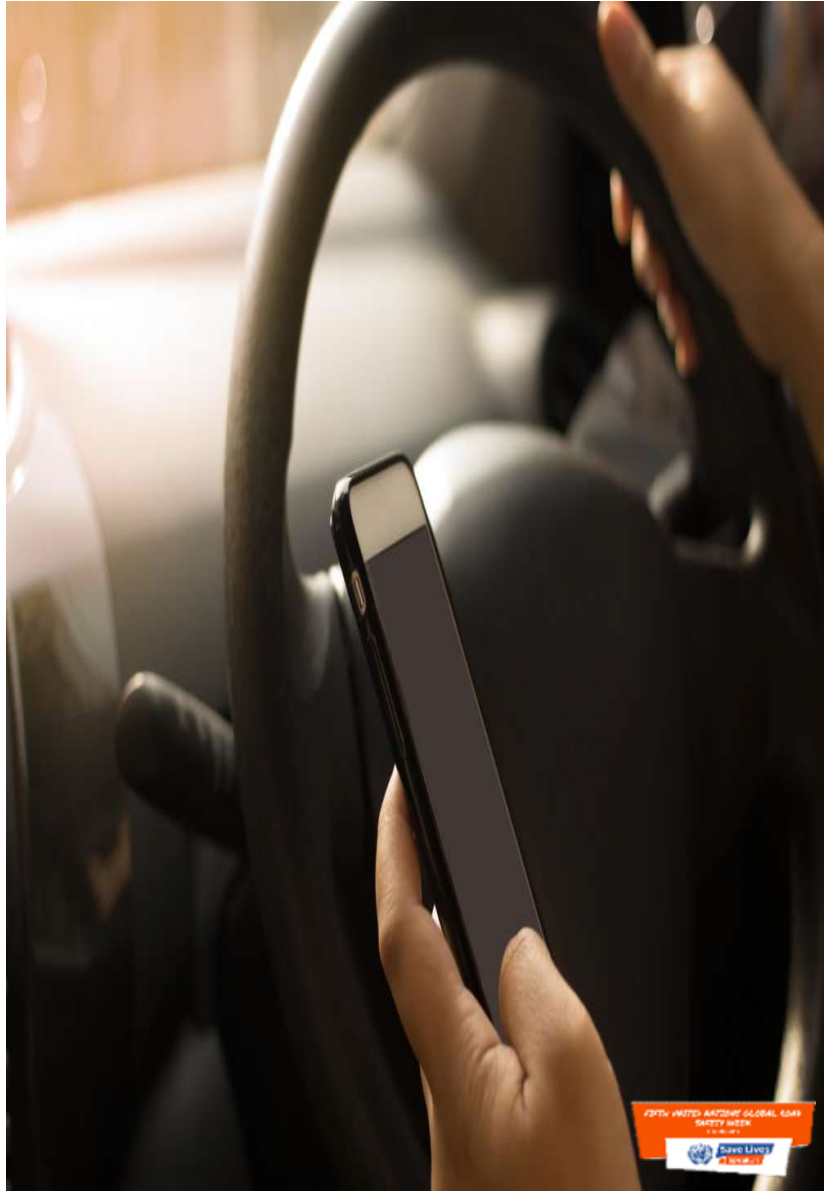
- Investigation of all available sources of data
  - Navigation companies were examined
  - More specialized solutions from other companies
- Reorganisation and categorisation of the provided data from the companies
  - Different meanings and formats in each company
- Developing a common analysis structure
  - Complex data structures
  - Universal description
  - Easy to read and analyse

Risk Exposure Data

- **Road Network** (Road Type, Area Type)
  - High Availability: Google, HERE, TomTom
- **Roadway Geometry** (Horizontal & Vertical Curvature)
  - High Availability: Google, HERE, TomTom
- **Vehicles** (Vehicle Type, Engine Size, Fuel Type)
  - Low Availability: Waze, Uber, IdealSpot
- **Driver Characteristics** (Age, Gender, Nationality)
  - Low Availability: Streetlight (mainly demographics)
- **Distance Parameters** (Person- & Vehicle-kms of Travel)
  - Low Availability: INRIX, Streetlight
- **Traffic Parameters** (Traffic Flow, Density, Volume)
  - High Availability: INRIX, Streetlight, IdealSpot

Road Safety Performance Indicators

- **Speed** (Mean Speed, Temporal Variation, Speed Limit)
  - High Availability: HERE, TomTom, INRIX
- **Road User** (Seatbelt & Helmet Wearing Rate)
  - No Availability: Alternative Sources
- **Traffic Law Enforcement** (Controls, Speed Cameras)
  - Low Availability: Waze, HERE, TomTom, Yandex
- **Roads** (Proportion of travel by type of road)
  - Low Availability: INRIX, Streetlight
- **Post-Crash Care** (Mean EMS Response Time)
  - No Availability: Alternative Sources



Accident Data

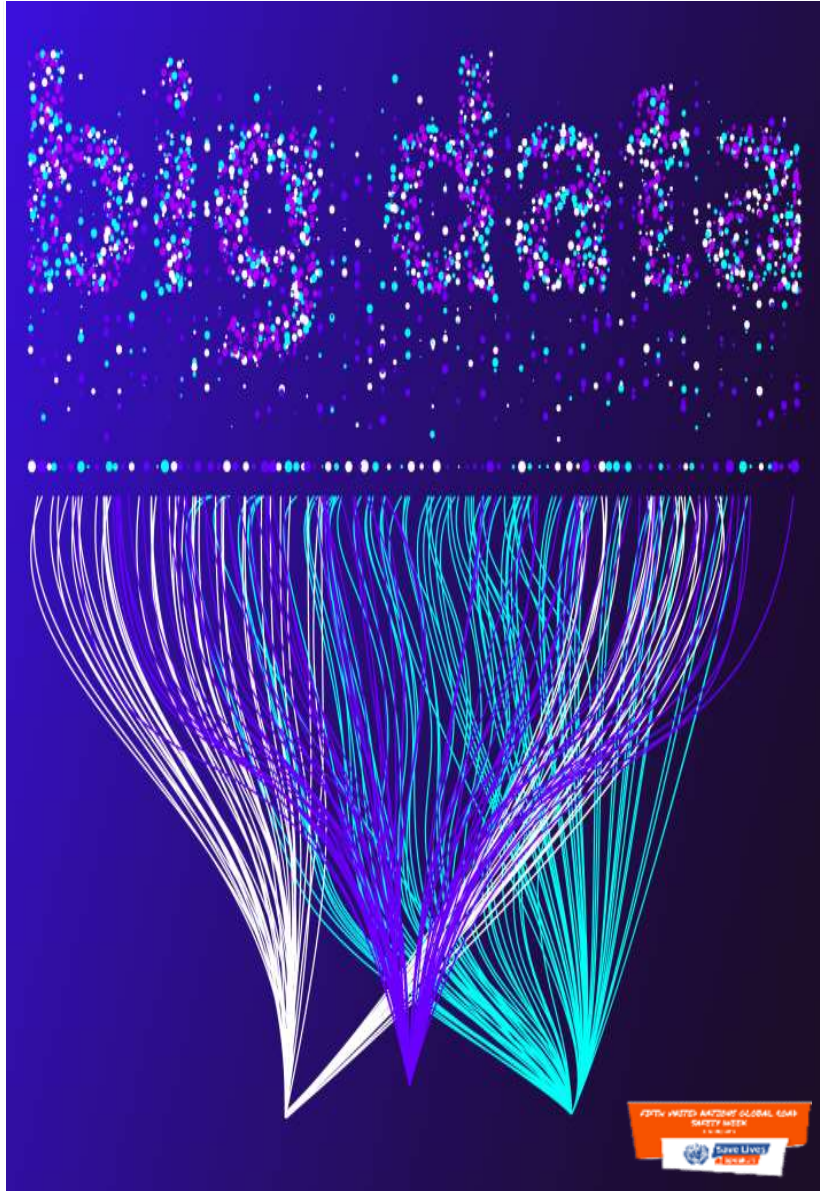
The crash-related data comes in a uniform format:

- Number of Incidents (Including Crashes)
- Type of Delay
- Start & End Location of Crashes
- Road Name
- Type of Area/Road
- Length (In Time) of the Delay
- Weather Conditions
- Significance

Primary Sources: Waze, HERE, TomTom, Yandex, INRIX
Data Extraction Methods: Crowdsourcing, Partnerships, Algorithmically generated flow-based incidents

Alternative Data Sources

- **Logistics and Fleet Operators**
  - UPS, DHL, XPO Logistics, etc.
- **Automotive Manufacturers**
  - Tesla, VW, Toyota, BMW, Ford, etc.
- **Telecommunication Agencies**
  - Verizon, AT&T, Vodafone Group, etc.
- **Carsharing Companies**
  - Uber, Lyft, Cabify, Careem, Easy Taxi, etc.
- **Social Media Platforms**
  - Facebook, Twitter, VK, Instagram, etc.



Scientific and Social Impact

- Alternative data that could lead to new road safety analyses in order to:
  - more efficiently describe the road safety phenomenon
  - be used for the validation of traditional research results

- New increased net present value of road safety data, available for early problem detection and prompt and customised decision support

- Continuous driver support with aim to improve driver behavior and develop better road safety culture at all road users, stakeholders and the Authorities

Future Challenges

- Adapting to new environments and ways of extracting data in the future
- Exploring alternative sources of data concerning variables with limited information
- Enrichment and improvement of existing data from users themselves that will contribute to the system in order to improve road safety
- Inspection of new statistical methods in order to increase the accuracy of road safety analysis results by using Big Data
- Development and continuous update of policies and processes in order to ensure personal data privacy and security.

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